SEQUENCE LISTING

<110> The Council of the Queensland Institute of Medical R esearch

<120> Epstein Barr Virus Peptide Epitopes, Polyepitopes and Delivery System Therefor

<130> 11441PC

<150> 2003901792

<151> 2003-04-15

<150> 2002952524

<151> 2002-11-07

<160> 125

<170> PatentIn version 3.1

<210> 1

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 1

Tyr Leu Gln Gln Asn Trp Trp Thr Leu 1 5

<210> 2

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 2

Glu Ser Asp Ser Asn Ser Asn Glu Gly
1 5

<210> 3

<211> 9

<212> PRT

<213> Epstein Barr Virus

```
<400> 3
Tyr Leu Leu Glu Met Leu Trp Arg Leu
               5
<210> 4
<211> 3
<212> PRT
<213> Epstein Barr Virus
<400> 4
Gln Arg His
1
<210> 5
<211> 5
<212> PRT
<213> Epstein Barr Virus
<400> 5
Ala Gly Asn Asp Gly
               5
<210> 6
<211> 3
<212> PRT
<213> Epstein Barr Virus
<400> 6
Gln Asn Trp
<210> 7
<211> 4
<212> PRT
<213> Epstein Barr Virus
```

<400> 7

```
Val Leu Tyr Ser
 <210> 8
 <211> 6
 <212> PRT
 <213> Epstein Barr Virus
 <400> 8
Asp Ser Asn Ser Asn Glu
<210> 9
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 9
Gln Arg His Ser Asp Glu His His His
               5
<210> 10
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 10
Gly Gln Arg His Ser Asp Glu His His
<210> 11
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 11
```

Tyr Tyr His Gly Gln Arg His Ser Asp

4/33

1 5

<210> 12

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 12

Trp Met Tyr Tyr His Gly Gln Arg His
1 5

<210> 13

<211> 12

<212> PRT

<213> Epstein Barr Virus

<400> 13

Tyr Tyr His Gly Gln Arg His Ser Asp Glu His His 1 5 10

<210> 14

<211> 12

<212> PRT

<213> Epstein Barr Virus

<400> 14

Ile Trp Met Tyr Tyr His Gly Gln Arg His Ser Asp
1 5 10

<210> 15

<211> 17

<212> PRT

<213> Epstein Barr Virus

<400> 15 ·

Leu Ile Trp Met Tyr His Gly Gln Arg His Ser Asp Glu His His

1 5 10 15

His

<400> 19

```
<210> 16
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 16
Ala Gly Asn Asp Gly Gly Pro Pro Gln
                5
<210> 17
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 17
Pro Ser Asp Ser Ala Gly Asn Asp Gly
1
<210> 18
<211> 12
<212> PRT
<213> Epstein Barr Virus
<400>
      18
Ser Asp Ser Ala Gly Asn Asp Gly Gly Pro Pro Gln
             · 5
                                   10
<210>
       19
<211>
       12
<212> PRT
<213> Epstein Barr Virus
```

Asp Ser Ala Gly Asn Asp Gly Gly Pro Pro Gln Leu 1 5 10

<210> 20

<211> 17

<212> PRT

<213> Epstein Barr Virus

<400> 20

Pro His Ser Pro Ser Asp Ser Ala Gly Asn Asp Gly Gly Pro Pro Gln

1 5 10 15

Leu

<210> 21

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 21

Ile Ala Leu Tyr Leu Gln Gln Asn Trp

5

<210> 22

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 22

Ala Leu Tyr Leu Gln Gln Asn Trp Trp

1 5

<210> 23

<211> 9

<212> PRT

<213> Epstein Barr Virus

```
<212> PRT
<213> Epstein Barr Virus
<400> 23
Gln Asn Trp Trp Thr Leu Leu Val Asp
               5
<210> 24
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400>. 24
Leu Tyr Leu Gln Gln Asn Trp Trp Thr
<210> 25
<211> 12
<212> PRT
<213> Epstein Barr Virus
<400> 25
Ile Ala Leu Tyr Leu Gln Gln Asn Trp Trp Thr Leu
                                   10
               5
<210> 26
<211> 12
<212> PRT
<213> Epstein Barr Virus
<400> 26
Tyr Leu Gln Gln Asn Trp Trp Thr Leu Leu Val Asp
               5
                              . 10
<210> 27
<211> 17
```

<400> 27

Leu Ile Ile Ala Leu Tyr Leu Gln Gln Asn Trp Trp Thr Leu Leu Val

1 5 10 15

Asp

<210> 28

<211> 10

<212> PRT

<213> Epstein Barr Virus

<400> 28

Ala Leu Leu Val Leu Tyr Ser Phe Ala Leu 1 5 10

<210> 29

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 29

Leu Leu Val Leu Tyr Ser Phe Ala Leu

5

<210> 30

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 30

Ala Leu Leu Val Leu Tyr Ser Phe Ala 1 5

<211> 12

```
<210> 31
 <211> 9
 <212> PRT
 <213> Epstein Barr Virus
 <400> 31
Val Leu Tyr Ser Phe Ala Leu Met Leu
                5
<210> 32
<211> 12
 <212> PRT
<213> Epstein Barr Virus
<400> 32
Ala Leu Leu Val Leu Tyr Ser Phe Ala Leu Met Leu
                                   10
<210> 33
<211> 12
<212> PRT
<213> Epstein Barr Virus
<400> 33
Gly Ala Leu Leu Val Leu Tyr Ser Phe Ala Leu Met
<210> 34
<211> 12
<212> PRT
<213> Epstein Barr Virus
<40.0> 34
Asp Trp Thr Gly Gly Ala Leu Leu Val Leu Tyr Ser
               5
<210> 35
```

```
<212> PRT
<213> Epstein Barr Virus
<400> 35
Gly Gly Ala Leu Leu Val Leu Tyr Ser Phe Ala Leu
                                   10
                5
<210> 36
<211> 17
<212> PRT
<213> Epstein Barr Virus
<400> 36
Asp Trp Thr Gly Gly Ala Leu Leu Val Leu Tyr Ser Phe Ala Leu
                5
                                   10
                                                       15
1
Leu
<210> 37
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 37
Asp Ser Asn Ser Asn Glu Gly Arg His
1
<210> 38
<211> 12
<212> PRT
<213> Epstein Barr Virus
<400> 38
```

Ser Gly His Glu Ser Asp Ser Asn Ser Asn Glu Gly

10

5

1

15

10

```
<210> 39
<211> 17
<212> PRT
<213> Epstein Barr Virus
<400> 39
Thr Asp Asp Ser Gly His Glu Ser Asp Ser Asn Ser Asn Glu Gly
Arg
1
                5
His
<210> 40
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 40
Ala Leu Leu Val Leu Tyr Ala Phe Ala
               5
₹210> 41
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 41
Ile Ala Leu Tyr Leu His Gln Asn Trp
<210> 42
<211> 9
```

<212> PRT

<213> Epstein Barr Virus

```
<400> 42
```

Ile Ala Leu Tyr Leu Gln His Asn Trp

5

<210> 43

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 43

Leu Ala Leu Tyr Leu Gln Gln Asn Trp

5

<210> 44

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 44

Tyr Phe Leu Glu Ile Leu Trp Arg Leu 1 5

<210> 45

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 45

Tyr Phe Leu Glu Ile Leu Trp Gly Leu
1 5

<210> 46

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 46

Tyr Leu Leu Glu Ile Leu Trp Arg Leu 1 5

<210> 47

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 47

Tyr Phe Leu Asp Ile Leu Trp Arg Leu 1 5

<210> 48

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 48

Tyr Leu Met Glu Ile Leu Trp Arg Leu 1 5

<210> 49

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 49

Tyr Leu His Gln Asn Trp Trp Thr Leu 1 5

<210> 50

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 50

Tyr Leu Gln His Asn Trp Trp Thr Leu 5

```
<210> 51
<211> 11
<212> PRT
<213> Epstein Barr Virus
<400> 51
Ser Ser Cys Ser Ser Cys Pro Leu Ser Lys Ile
                                   10
                5
<210> 52
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 52
Pro Tyr Leu Phe Trp Leu Ala Ala Ile
<210> 53
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 53
Thr Tyr Gly Pro Val Phe Met Cys Leu
               5
<210> 54
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 54
Arg Arg Arg Trp Arg Arg Leu Thr Val
1
               5
```

<211> 9

```
<210> 55
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 55
Leu Leu Ser Ala Trp Ile Leu Thr Ala
               5
<210> 56
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 56
Leu Thr Ala Gly Phe Leu Ile Phe Leu
1 .
               5
<210> 57
<211> 10
<212> PRT
<213> Epstein Barr Virus
<400> 57
Val Met Ser Asn Thr Leu Leu Ser Ala Trp
1.
                                   10
               5
<210> 58
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 58
Ile Glu Asp Pro Pro Phe Asn Ser Leu
<210> 59
```

<212> PRT <213> Epstein Barr Virus <400> 59 Cys Leu Gly Gly Leu Leu Thr Met Val <210> 60 <211> 18 <212> PRT <213> Epstein Barr Virus <400> 60 Leu Val Leu Gly Ile Trp Ile Tyr Leu Leu Glu Met Leu Trp Arg Arg 10 15 5 1

Leu Gly

<210> 61 <211> 17 <212> PRT <213> Epstein Barr Virus <400> 61

Arg His Ser Asp Glu His His His Asp Asp Ser Leu Pro His Pro Gln

1 5 10 15

Gln

<210> 62 <211> 27 <212> DNA

```
<213> Epstein Barr Virus
```

<400> 62

gccctccttg tcctctattc ctttgct 27

<210> 63

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 63

gegeteettg teetetatte etttget 27

<210> 64

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 64

gcactcttgg tcctctattc ctttgct 27

<210> 65

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 65

gcgctccttg tcctctatac ctttgct 27

<210> 66

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 66

attgctctct atctacaaca aaactgg

27

```
<210> 67 ·
```

<211> 27

<212> DNA .

<213> Epstein Barr Virus

<400> 67

attgctctct atctacacca aaactgg 27

<210> 68

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 68

cttgctctct atctacaaca aaactgg

27

<210> 69

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 69

attgctctct atctacaaca caactgg

27

<210> 70

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 70

tacttattgg agatgctctg gcgactt

27

<210> 71

<211> 27

<212> DNA

<213> Epstein Barr Virus

```
<400> 71
tacttettgg agattetetg gegaett
27
```

<210> 72

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 72

tacttcttgg agattctctg ggggctt 27

<210> 73

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 73

tacttattgg agattctctg gcgactt 27

<210> 74

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 74

tacttettgg agattetetg geggett 27

<210> 75

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 75

tacttettgg acattetetg geggett 27

<210> 76

```
<211> 27
```

<212> DNA

<213> Epstein Barr Virus

<400> 76

tacctaatgg agattctctg gcgactt 27

<210> 77

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 77

tatctacaac aaaactggtg gactcta 27

<210> 78

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 78

tatctacacc aaaactggtg gactcta 27

<210> 79

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 79

tatctacaac acaactggtg gactcta
27

<210> 80

<211> 27

<212> DNA

<213> Epstein Barr Virus

<400> 80

tacttcttgg aaattctctg gcggctt

27

<210> 81

<211> 122

<212> PRT

<213> Synthetic protein sequence

<400> 81

Met Pro Tyr Leu Phe Trp Leu Ala Ala Ile Ser Ser Cys Ser Ser

5 10 15 1

Pro Leu Ser Lys Ile Thr Tyr Gly Pro Val Phe Met Cys Leu Arg Arg 30

25 20

Arg Trp Arg Arg Leu Thr Val Leu Leu Ser Ala Trp Ile Leu Thr Ala

> 45 35 40

Leu Thr Ala Gly Phe Leu Ile Phe Leu Cys Leu Gly Gly Leu Leu Thr

50 55 60

Met Val Val Met Ser Asn Thr Leu Leu Ser Ala Trp Ile Glu Asp Pro

65 70 75 80 .

Pro Phe Asn Ser Leu Tyr Leu Leu Glu Met Leu Trp Arg Leu Tyr

85 90 95



Gln Gln Asn Trp Trp Thr Leu Ala Leu Leu Val Leu Tyr Ser Phe Ala

100 105 110

Leu Ile Ala Leu Tyr Leu Gln Gln Asn Trp
115 120

<210> 82

<211> 366

<212> DNA

<213> Synthetic nucleotide sequence

<400> 82

atgccctacc tgttctggct ggccgccatc agcagctgca gcagctgccc cctg agcaag 60

atcacctacg geecegtgtt catgtgeetg aggaggaggt ggaggagget gacc gtgetg 120

ctgagegeet ggattetgae egecetgaee geeggettee tgatetteet gtge etggge 180

ggcctgctga ccatggtggt gatgagcaac accctgctga gcgcctggat cgag gaccc 240

cccttcaaca gcctgtacct gctggagatg ctgtggaggc tgtacctgca gcag aactgg 300

tggaccetgg ceetgetggt getgtacage ttegecetga tegecetgta cetg cageag 360

aactgg

366

<210> 83

<211> 12

<212> PRT

<213> Epstein Barr Virus

<400> 83

Leu Tyr Leu Gln Gln Asn Trp Trp Thr Leu Leu Val

. . 5 1 10 <210> 84 <211> 12 <212> PRT <213> Epstein Barr Virus <400> 84 Ala Leu Tyr Leu Gln Gln Asn Trp Trp Thr Leu Leu 10 <210> 85 <211> 12 <212> PRT <213> Epstein Barr Virus <400> 85 Ile Ala Leu Tyr Leu Gln Gln Asn Trp Trp Thr Leu 5 <210> 86 <211> 12 <212> PRT <213> Epstein Barr Virus <400> 86 Ile Ile Ala Leu Tyr Leu Gln Gln Asn Trp Trp Thr 10 <210> 87 <211> 12 <212> PRT <213> Epstein Barr Virus <400> 87 Leu Ile Ile Ala Leu Tyr Leu Gln Gln Asn Trp Trp

<210> 92

```
<210> 88
 <211> 12
 <212> PRT
 <213> Epstein Barr Virus
 <400> 88
 His Glu Ser Asp Ser Asn Ser Asn Glu Gly Arg His
                                     10 '
                 5
 1
<210> 89
 <211> 12
 <212> PRT
 <213> Epstein Barr Virus
 <400> 89
 Gly His Glu Ser Asp Ser Asn Ser Asn Glu Gly Arg
                                    10
 <210> 90
 <211> 12
 <212> PRT
 <213> Epstein Barr Virus
 <400> 90
 Asp Ser Gly His Glu Ser Asp Ser Asn Ser Asn Glu
                                    10
 1
                5
 <210> 91
 <211> 12
 <212> PRT
 <213> Epstein Barr Virus
 <400> 91
Asp Asp Ser Gly His Glu Ser Asp Ser Asn Ser Asn
                                    10
                5
```

<212> PRT

```
<211> 12
 <212> PRT
 <213> Epstein Barr Virus
 <400> 92
Thr Asp Asp Ser Gly His Glu Ser Asp Ser Asn Ser
                5
                                    10
 <210> 93
<211> 12
<212> PRT
<213> Epstein Barr Virus
<400> 93
Pro Ser Asp Ser Ala Gly Asn Asp Gly Gly Pro Pro
                5
                                    10
<210> 94
<211> 12
<212> PRT
<213> Epstein Barr Virus
<400> 94
Ser Pro Ser Asp Ser Ala Gly Asn Asp Gly Gly Pro
                5
                                    10
<210> 95
<211> 12
<212> PRT
<213> Epstein Barr Virus
<400> 95
His Ser Pro Ser Asp Ser Ala Gly Asn Asp Gly Gly
1
               5
                                   10
<210> 96
<211> 12
```

```
<213> Epstein Barr Virus
<400> 96
Pro His Ser Pro Ser Asp Ser Ala Gly Asn Asp Gly
                5
                                    10
<210> 97
<211> 12
<212> PRT
<213> Epstein Barr Virus
<400> 97
Thr Gly Gly Ala Leu Leu Val Leu Tyr Ser Phe Ala
                                   10
<210> 98
<211> 12
<212> PRT
<213> Epstein Barr Virus
<400> 98
Trp Thr Gly Gly Ala Leu Leu Val Leu Tyr Ser Phe
               5
                                   10
<210> 99
<211> 12
<212> PRT
<213> Epstein Barr Virus
<400> 99
Asp Trp Thr Gly Gly Ala Leu Leu Val Leu Tyr Ser
               5
                                   10
<210> 100
<211> 9
<212> PRT
<213> Epstein Barr Virus
```

```
<400> 100
```

Leu Val Leu Tyr Ser Phe Ala Leu Met 1 5

<210> 101

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 101

Gly Ala Leu Leu Val Leu Tyr Ser Phe 1 5

<210> 102

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 102

Gly Gly Ala Leu Leu Val Leu Tyr Ser

<210> 103

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 103

Thr Gly Gly Ala Leu Leu Val Leu Tyr
1 5

<210> 104

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 104

1

```
Trp Thr Gly Gly Ala Leu Leu Val Leu
                5
<210> 105
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 105
Asp Trp Thr Gly Gly Ala Leu Leu Val
        . 5
1
<210> 106
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 106
Gln Gln Asn Trp Trp Thr Leu Leu Val
               5
<210> 107
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 107
Leu Gln Gln Asn Trp Trp Thr Leu Leu
1
               5
<210> 108
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 108
Leu Tyr Leu Gln Gln Asn Trp Trp Thr
```

5

```
<210> 109
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 109
Ile Ile Ala Leu Tyr Leu Gln Gln Asn
                5
<210> 110
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 110
Leu Ile Ile Ala Leu Tyr Leu Gln Gln
                5
<210> 111
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 111
Gly Asn Asp Gly Gly Pro Pro Gln Leu
                5
<210> 112
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 112
Ala Gly Asn Asp Gly Gly Pro Pro Gln
1
               5
```

<211> 9

```
<210> 113
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 113
Ser Ala Gly Asn Asp Gly Gly Pro Pro
                5
<210> 114
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 114
Asp Ser Ala Gly Asn Asp Gly Gly Pro
1
<210> 115
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 115
Ser Asp Ser Ala Gly Asn Asp Gly Gly
1
               5
<210> 116
<211> 9
<212> PRT
<213> Epstein Barr Virus
<400> 116
Ser Pro Ser Asp Ser Ala Gly Asn Asp
1
               5
<210> 117
```

```
<212> PRT
```

<213> Epstein Barr Virus

<400> 117

His Ser Pro Ser Asp Ser Ala Gly Asn 1 5

<210> 118

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 118

Pro His Ser Pro Ser Asp Ser Ala Gly
1 5

<210> 119

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 119

Ser Asp Ser Asn Ser Asn Glu Gly Arg 1 5

<210> 120

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 120

His Glu Ser Asp Ser Asn Ser Asn Glu
1 5

<210> 121

<211> 9

<212> PRT

<213> Epstein Barr Virus

```
<400> 121
```

Gly His Glu Ser Asp Ser Asn Ser Asn 1 5

<210> 122

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 122

Ser Gly His Glu Ser Asp Ser Asn Ser 1 5

<210> 123

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 123

Asp Ser Gly His Glu Ser Asp Ser Asn 1 5

<210> 124

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 124

Asp Asp Ser Gly His Glu Ser Asp Ser 1 5

<210> 125

<211> 9

<212> PRT

<213> Epstein Barr Virus

<400> 125



Thr Asp Asp Ser Gly His Glu Ser Asp 5